

Effect of video assisted modelling on vital signs during dental procedures under rubber dam placement in children

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Abstract:

Background information- Modeling refers to learning by observation and children may reproduce behavior exhibited by the model in the same situation. Several studies on modeling have demonstrated its therapeutic effect in management of anxiety and educational effect in improving coping skills of children in stressful situations. Often in pediatric patients placement of rubber dam is omitted in certain age groups as it is assumed to cause stress or because of lack of compliance from the patient. **Aim** – To evaluate the effect of video assisted modelling on arterial pulse and blood pressure after rubber dam placement during dental procedures in children of 8-10 years age. **Methodology-** Total 32 patients of 8-10 years of age with Class I caries lesion on mandibular teeth which can be restored were selected. All the selected patients were divided into two groups, Group A- in which video assisted modelling was done before rubber dam placement and Group B- in which modelling was not done. In both the groups, the patient's parameters such as blood pressure and pulse rate which denotes stress levels were recorded at three measuring points i.e before starting procedure, after rubber dam placement and after completion of procedure. In all patients, caries excavation followed by restoration was carried out. **Results-** During the procedure, significant increase in blood pressure and pulse rate was seen in Group B after rubber dam placement. Comparison of pulse rate between two groups showed non-significant difference between Group A and Group B before treatment, and after completion of the treatment but showed significant difference after rubber dam placement. **Conclusion-** Though stress levels are increased during dental procedures effective behavior management technique should be used to make the treatment more patient friendly. Video assisted modelling is an effective technique which can help pretrain patients to reduce treatment induced anxiety.

Keywords: Modelling, Rubber dam, behaviour management, dental anxiety, dental fear

Advances in knowledge:

Pediatric dentistry consists routine incorporation of various behaviour management techniques, sometimes combination of two. Thus constant improvement in these techniques is necessary to provide comprehensive dental care to child. In this study, video assisted modelling, not much studied behaviour management technique was used to check its effectiveness during the dental procedures.

Application to patient care:

Since the change in the arterial pulse rate and blood pressure are directly associated with short term stress experienced by the individual, this study helped us quantify those levels and also understand the effect of rubber dam on restorative procedures in children and therefore ease it out by appropriate behavior management techniques.

Introduction:

A child enters dental clinic with bundle of energy and enormous fear and anxiety. These emotions cause certain behavioural changes, which can affect the quality of care. But the child's energy can be translated in good behavior by using appropriate behavior management techniques. However, it was pointed out at the American Academy of Pediatric Dentistry conference in 2003 that over the past few decades, there have been more studies on pharmacologic management techniques than on nonpharmacologic techniques.[1] Though various studies on pharmacological behaviour management, non pharmacological behaviour management techniques still are the primary mainstay of behaviour management in pediatric patients. Studies on modeling have demonstrated its therapeutic effect in management of anxiety and educational effect in improving coping skills of children in stressful situations.[2,3] Thus the aim of study, to evaluate the effect of video assisted modelling on arterial pulse and blood pressure after rubber dam placement during dental procedures in children of 8-10 years age.

Materials and methods:

This study was conducted in the Department of Pediatric and Preventive Dentistry during September 2021 to December 2021. Ethical clearance was obtained from the Institutional ethical committee of Bharati Vidyapeeth Dental College and Hospital, Pune before beginning the study (Certificate number: BVDUDCH/IEC/ 15/ 2021-22) and it was conducted in agreement with the principles postulated in the Declaration of Helsinki. Informed consent forms were signed by parents

Study sample:

The study was a randomized, controlled, parallel group single-centre clinical trial with comparative analysis of the 2 patient groups.

The study sample consisted of children 8 to 10 years of age, randomly divided into the following 2 groups:

- Group I: Patients in which video assisted modelling will be done before rubber dam placement

- Group II: Patients in which video assisted modelling will not be done before rubber dam placement.

Selection Criteria:

Total 32 ASA Class I patients of 8-10 years age, of either sex, with Frankl rating 4 i.e definitely positive patients, with Class I caries lesion on mandibular teeth which can be restored were selected.

The inclusion criteria for the study were as follows:

1. Patient age between 8-10 years
2. Patients with Frankl's rating 4 i.e definitely positive patients
3. Mandibular molars with Class I caries lesion.

The exclusion criteria were as follows:

1. Medically compromised patients
2. Differently abled patients and patients unable to communicate
3. Patient with systemic disease eg. Asthma, COPD, Epilepsy
4. Patient unwilling to be a part of the study
5. Patient with known allergy of latex.

Children were excluded from the study if the child's cooperation was compromised or parents not willing to be a part of study.

Data Collection:

In each child of both the groups, during the restorative procedure under rubber dam, blood pressure and pulse rate were the parameters monitored and recorded at three measuring points by an assistant. Blood pressure and pulse rate were measured using automatic digital blood pressure monitor (arm automatic blood pressure meter, India; Model no-RS-BP-1004) and pediatric blood pressure cuff (17-22cm). To establish a baseline, each patient's arterial pulse and blood pressure was recorded in every patient before starting procedure. Therefore, the three measuring points were such as baseline, after rubber dam placement and after the treatment completion.



Figure 1 Automatic digital blood pressure monitor with pediatric cuff

Study Procedure:

Parents were informed in detail about how the study would be conducted and about their right to refuse or discontinue participation at any time and were then asked to sign a consent form. In Group I, before placing rubber dam video assisted modelling was done using a mobile phone as a behaviour management technique. A 2 minute video was shown in which a child of same age group undergoing dental treatment under rubber dam. In Group II, communication was the only behaviour management technique used. In all patients, caries excavation followed by restoration was carried out under rubber dam.



Figure 2 Video assisted modelling using mobile phone for 8 year old child



Figure 3 Vital signs monitoring using automatic digital blood pressure monitor

Statistical analysis:

For the comparison of the mean values between groups at different measuring points, Paired t-test with ANOVA test followed by post hoc test was used. The level for statistical significance was set at $P < 0.05$.

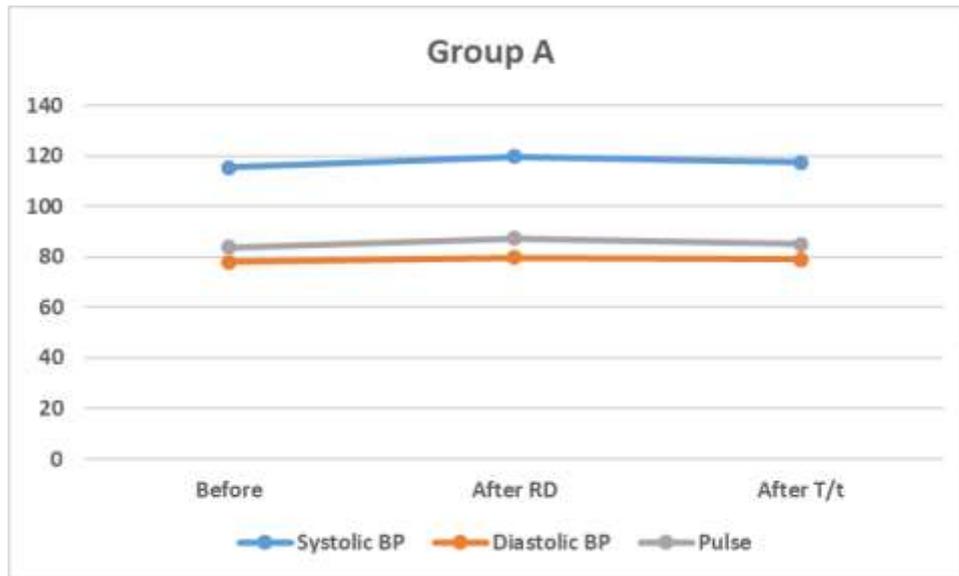
Results:

A total of 32 children met the study criteria and participated in the study: 16 in each group.

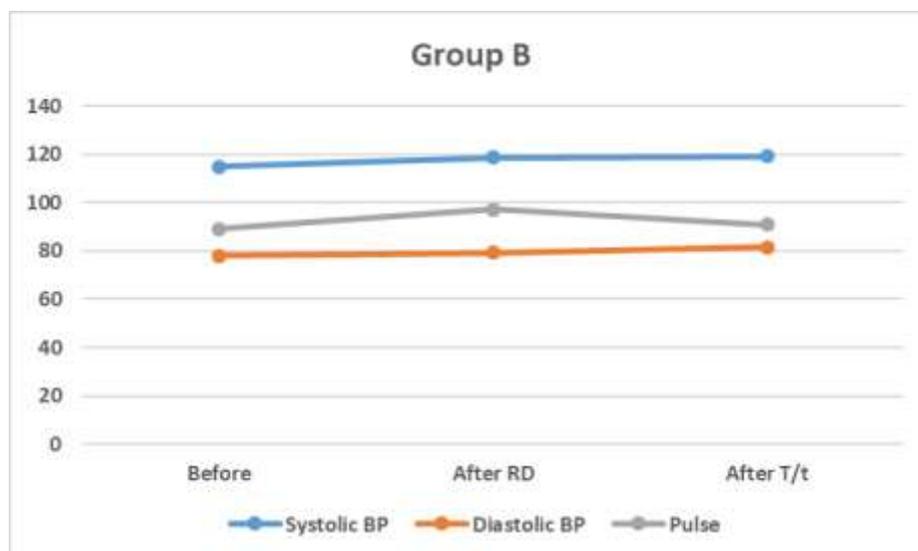
Table 1: Evaluation of change in blood pressure and pulse within each group

Groups	Variable	Before	After RD	After T/t	p value
Gr A	Systolic BP	115.38 ± 8.05	119.69 ± 6.14	117.44 ± 7.24	0.066 (NS)
	Diastolic BP	78.06 ± 8.78	79.75 ± 9.84	78.94 ± 8.43	0.594 (NS)
	Pulse	83.75 ± 5.87	87.44 ± 8.26	85.13 ± 5.28	0.019*
Gr B	Systolic BP	114.94 ± 9.01	118.69 ± 6.14	119.31 ± 5.71	0.016*
	Diastolic BP	77.94 ± 8.69	79.38 ± 12.25	81.63 ± 9.82	0.255 (NS)
	Pulse	89.12 ± 11.76	97.25 ± 13.84	91.00 ± 10.75	0.002*

Repeated measure ANOVA test; * indicates significant difference at $p \leq 0.05$; NS: Non-significant difference



Graph 1 Change in blood pressure and pulse in Group A



Graph 2 Change in blood pressure and pulse in Group B

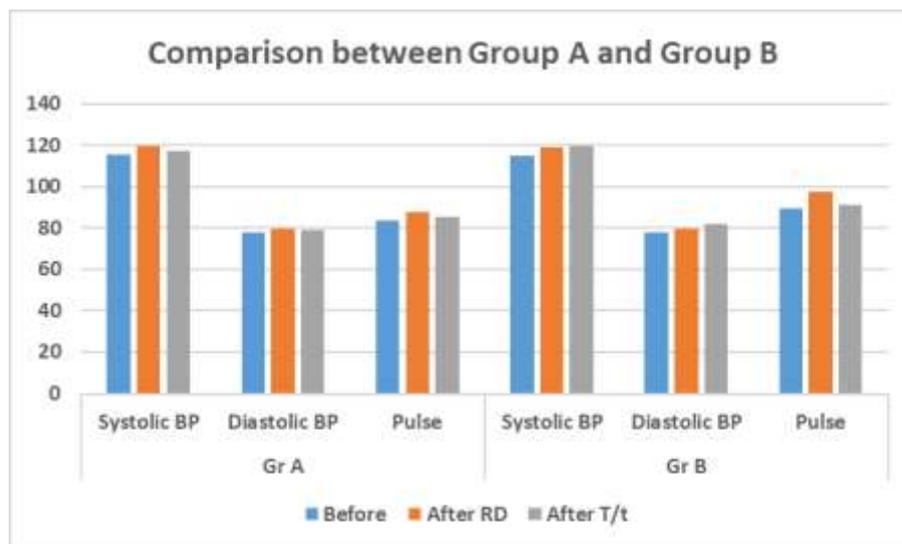
Systolic BP in group A showed an increase after rubber dam placement and again decreased after completion of treatment and this overall change in systolic BP in group A from pre-treatment to post treatment was non-significant. Diastolic BP in group A showed an increase after rubber dam placement and again decreased after completion of treatment and this overall in change in diastolic BP in group A from pre-treatment to post treatment was non-significant. Pulse rate in group A showed an increase after rubber dam placement and again decreased after completion of treatment and this overall change in Pulse rate in group A from pre-treatment to post treatment was significant.

Systolic BP in group B showed an increase after rubber dam placement and again decreased after completion of treatment and this overall change in systolic BP in group B from pre-treatment to post treatment was significant. Diastolic BP in group B showed an increase after rubber dam placement and again decreased after completion of treatment and this overall in change in diastolic BP in group B from pre-treatment to post treatment was non-significant. Pulse rate in group B showed an increase after rubber dam placement and again decreased after completion of treatment and this overall change in Pulse rate in group B from pre-treatment to post treatment was significant.

Table 2: Pairwise comparison of change in blood pressure and pulse within each group

Groups	Variable	Before vs After RD	Before vs After T/t	After RD vs After T/t
Gr A	Systolic BP	0.025*	0.334 (NS)	0.142 (NS)
	Diastolic BP	0.154 (NS)	0.662 (NS)	0.644 (NS)
	Pulse	0.001*	0.309 (NS)	0.058 (NS)
Gr B	Systolic BP	0.018*	0.021*	0.674 (NS)
	Diastolic BP	0.564 (NS)	0.107 (NS)	0.273 (NS)
	Pulse	0.001*	0.387 (NS)	0.027*

Post hoc LSD test; * indicates significant difference at $p \leq 0.05$; NS: Non-significant difference



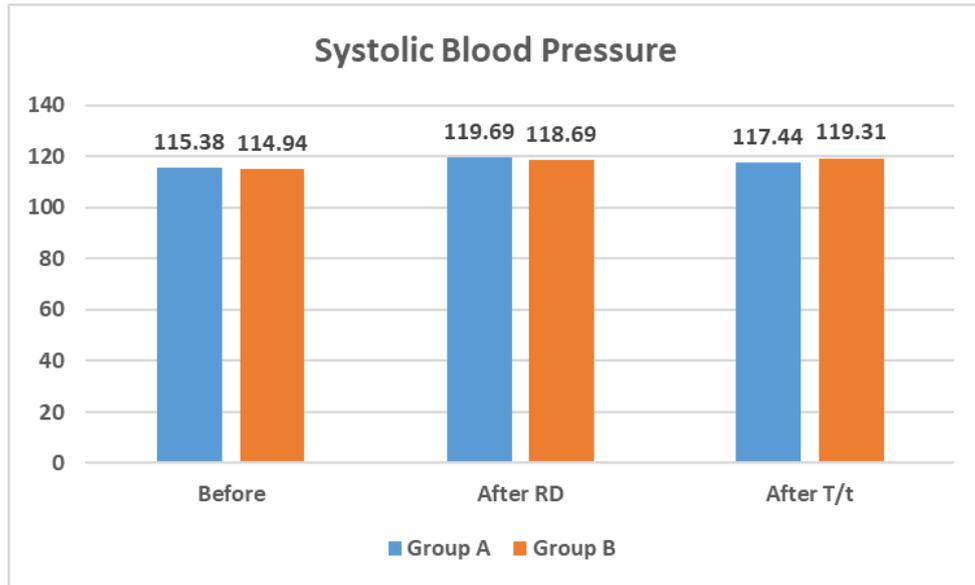
Graph 3 Comparison between Group A and Group B

Table 3: Comparison of systolic blood pressure between two groups

Variable	Gr A	Gr B	Difference	p value
Before	115.38 ± 8.05	114.94 ± 9.01	0.44	0.886 (NS)
After RD	119.69 ± 6.14	118.69 ± 6.14	1.00	0.648 (NS)
After T/t	117.44 ± 7.24	119.31 ± 5.71	-1.88	0.422 (NS)

Independent t test; NS: Non-significant difference

Comparison of systolic BP between two groups showed non-significant difference between Group A and Group B before treatment, after rubber dam placement and after completion of the treatment.



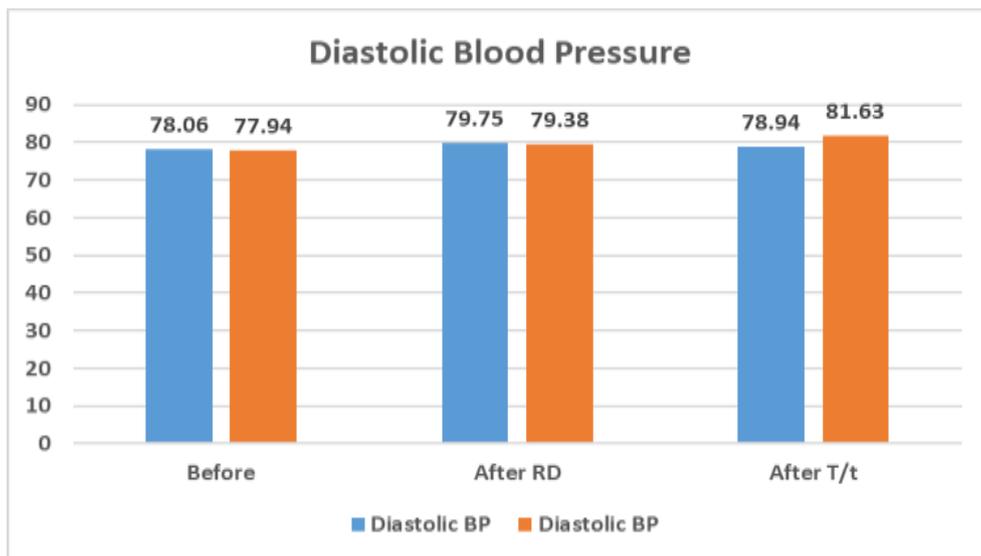
Graph 4 Comparison of systolic blood pressure between two groups

Table 4: Comparison of diastolic blood pressure between two groups

Variable	Gr A	Gr B	Difference	p value
Before	78.06 ± 8.78	77.94 ± 8.69	0.12	0.968 (NS)
After RD	79.75 ± 9.84	79.38 ± 12.25	0.37	0.925 (NS)
After T/t	78.94 ± 8.43	81.63 ± 9.82	-2.69	0.413 (NS)

Independent t test; NS: Non-significant difference

Comparison of diastolic BP between two groups showed non-significant difference between Group A and Group B before treatment, after rubber dam placement and after completion of the treatment.



Graph 5 Comparison of diastolic blood pressure between two groups

Table 5: Comparison of pulse between two groups

Variable	Gr A	Gr B	Difference	p value
Before	83.75 ± 5.87	89.12 ± 11.76	-5.38	0.112 (NS)
After RD	87.44 ± 8.26	97.25 ± 13.84	-9.81	0.021*
After T/t	85.13 ± 5.28	91.00 ± 10.75	-5.87	0.063 (NS)

Independent t test; * indicates significant difference at $p \leq 0.05$; NS: Non-significant difference

Comparison of pulse rate between two groups showed non-significant difference between Group A and Group B before treatment, and after completion of the treatment and a significant difference after rubber dam placement.



Graph 6 Comparison of pulse between two groups

Discussion:

Dental fear is still an important concern while dealing with pediatric patients. Fear of the unknown is one of the major reason to provoke anxiety and prevent them from seeking dental care.[5] Child's behaviour in a dental office can be result of various variables like age, past dental or medical history, parent's anxiety for seeking dental treatments, and parental behaviour.[5,6] Thus, with the help of various behaviour management techniques explaining the procedure to child in more acceptable way which can reduce the chance of inducing fear of unknown should be used.

There are various behaviour management techniques, namely, TSD, desensitization, modelling, distraction, positive reinforcement, hand-over-mouth, voice control, restrain/protective

stabilization, conscious sedation, and general anaesthesia. However, Tell-Show-Do and modelling techniques are the foundation of the child's behaviour guidance at first visits. Modelling can be either live or film modelling. Modelling depend on learning theory in which children are either explained or demonstrated about the dental procedure. [6,7]

The restorative procedure was chosen for this trial to induce a balanced and relatively low stress level in both groups. Other operative treatments in paediatric dentistry, can be considered more difficult to standardize and would have caused a wider variety of stress levels overlaying the stress caused by the isolation technique.[8]

Blood pressure and pulse rate have been reported to be bio signals related to stress; hence, they were measured.[10,11,12]

Machen and Johnson, Melamed et al. and Yahaya and Salam et al, have found the effectiveness of Filmed modelling in comparison to desensitization in various patients.[2,13] Paryab and Arab in 2014, conducted a study in which they evaluated the effect of filmed modelling in comparison with Tell-Show-Do technique children aged between 4 and 6 years during dental practice. In both groups, HR and behaviours of children using Venham and Frankl rating scales were recorded and found a statistically significant difference between both the groups. They reported that filmed modelling can be an alternative method to the TSD technique to reduce a child's anxiety and fear.[14] Similarly in this study, video assisted modelling was found effective in reducing stress levels in children aged 8-10 years.

Ammann et al. in 2014, conducted a study to evaluate stress parameters during a dental treatment procedure performed with or without rubber dam and concluded that isolation with rubber dam causes less stress in children and adolescents compared to cotton rolls.[8] Similar results were seen in study by Pol et al,2018[9]

In contrast, Bello et al (1994), concluded that both systolic and diastolic pressures do not change significantly in un sedated children undergoing routine dental treatment and there significant increase in pulse rate especially during injection, immediately after injection, during rubber dam application and cavity preparation.[15]

In this study, no significant changes were seen in blood pressure in both groups, but showed significant increase in arterial pulse after rubber dam placement in group in which video assisted modelling was not done. There can be various reasons for that such as no local anaesthesia was given clamp placement could have increased anxiety, also in cases where modelling was not done fear of unknown must have increased the anxiety. Also as this study was done post covid era where children were used to being in safer environment placement of rubber dam throughout procedure increased anxiety.

Limitations:

Limitations of the present study include as smaller sample size was taken, further studies to be done with larger sample sizes to yield better results.

Also in this study as only objective parameters were checked, further studies can include subjective parameters too.

Conclusion:

According to the methodology and the results of the present study, it can be concluded that video assisted modelling is an efficient behaviour management technique to control 8-10-year-old children's anxiety to achieve more cooperative behaviour during dental treatment as it can help pretrain patients to reduce treatment induced anxiety before starting any treatment. As stress levels are increased during dental procedures effective and appropriate behaviour management technique should be used to make the treatment more patient friendly.

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